START

0011363

October 15, 1990

Meeting Minutes Transmittal/Approval
Unit Managers Meeting: 1100-EM-1 Operable Unit
450 Hills/3000 Area
Richland, Washington
September 19, 1990

From/
Appvl.: Robert K. Stewart Date: 10/16/90
Robert K. Stewart, 1100-EM-1 Unit Manager, DOE-RL (A6-95)

Appvl.: David R. Einan Date: 16 Oct 90
David R. Einan, 1100-EM-1 Unit Manager, EPA (B5-01)

Appvl.: L Goldstein Date 10/16/90
Larry Goldstein, 1100-EM-1 Unit Manager, WA Department of Ecology

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Meeting Minutes are attached. Minutes are comprised of the following:

Attachment #1 - Meeting Summary/Summary of Commitments and Agreements
Attachment #2 - Agenda for the 1100-EM-1 Meeting
Attachment #3 - Attendance List
Attachment #4 - Operable Unit Commitments/Agreements Status List
Attachment #5 - Sampling of Groundwater Monitoring Wells
Attachment #6 - Radiochemical Analysis of Groundwater Monitoring Well Samples
Attachment #7 - Presentation Notes on Applicable or Relevant and Appropriate Requirements
Attachment #8 - 1100-EM-1 Remedial Invistigation Work Plan Schedule - Major Assumptions
Attachment #9 - Inorganic and Organic UTLs for Background Soils

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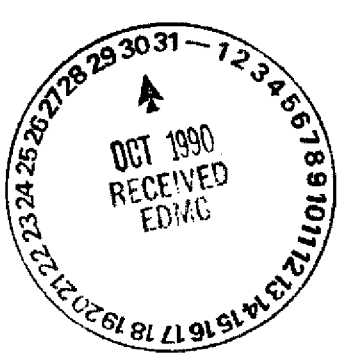
Prepared by: _____ Date: _____
SWEC Support Services

Concurrence by: _____ Date: _____
WHC RI Coordinator



Distribution:

Chuck Cline, WDOE
Ward Staubitz, USGS
Mike Thompson, DOE-RL (A6-95)
Mary Harmon, DOE-HQ, (EM-442)
Doug Fassett, SWEC (A4-35)
John Stewart, USACE
Jack Waite, WHC (B2-35)
Tom Wintczak, WHC (B2-15)
Mel Adams, WHC (H4-55)
Steven Clark, WHC (H4-55)

Brian Sprouse, WHC (H4-22)
Diane Clark, DOE-RL (A5-55)
Bill Price, WHC (S0-03)
Don Kane, Battelle EMO (K1-74)
Donna Lacombe, PRC
Jim Patterson, WHC

Ronald D. Izatt (A6-95)
Director, DOE-RL, ERD
June M. Hennig (A5-21)
DOE-RL, WMD

Roger D. Freeberg (A6-95)
Chief, Rstr. Br., DOE-RL,ERD

Steven H. Wisness
Tri-Party Agreement Proj. Mgr.
Richard D. Wojtasek (B2-15)
Prgm. Mgr. WHC

Kaerae Parnell (H4-18)
Doug Sherwood, EPA (B5-01)
Michael Neely, PNL (K6-96)

ADMINISTRATIVE RECORD: 1100-EM-1; Care of Susan Wray, WHC (H4-51C)

Please contact Doug Fassett if there are any deletions or additions to this list.

Attachment #1

Meeting Summary and Summary of Commitments and Agreements
1100-EM-1 Operable Unit Managers Meeting
450 Hills/3000 Area
Richland, Washington
September 19, 1990

1. Doug Fassett (SWEC) circulated the 1100-EM-1 minutes from the August 15, 1990, meeting for approval and signature.

2. Steve Clark reported on work progress (see Attachment #2). The RI Phase 1 Report was issued to the regulators by August 31, 1990. Comments were requested by the close of business on October 15, 1990.

   The FS Phase 1 and 2 Report began joint review by DOE and WHC on September 7, 1990. Comments were requested by close of business on October 8, 1990.

   The RI Phase 2 Work Plan Supplement will be delivered for parallel review by DOE, EPA, Ecology, and WHC on October 1, 1990. Mr. Clark stated that the work package supplement is currently in an internal review process.

   The third round of groundwater monitoring well sampling was completed on September 6, 1990. The fourth round is scheduled for late November, 1990.

3. Susan Poyer Jones (Engineering-Science, Inc.) gave a presentation on Applicable or Relevant and Appropriate Requirements (ARAR) (see Attachment #7).

4. Laura Johnson from Golder presented the "1100-EM-1 Phase 1 Remedial Investigation Work Plan Schedule Major Assumptions" (see Attachment #8). There was some discussion of the schedule and the impact upon the schedule and scope of work with the Bush Budget.

5. Steve Clark (WHC) presented the second round of radiochemical analyses from ground water sampling (see Attachments #5 and #6). He stated that the radiochemical analyses from the second round (May 1990) of ground water sampling were not available for inclusion in the RI Phase 1 Report because another laboratory had to be selected to do the analyses when U.S. Testing was disqualified. U.S. Testing completed the first round of sample analyses; Martin Marietta analyzed the second round and will analyze the third round. *Random differences between laboratories accounts for the discrepancies bvetween first and second round data, except in the case of well MW-3. The first-round ground water sample from MW-3 was turbid (contained suspended solids) causing a false gross alpha analysis in excess of the drimking water Minimum Concentration Limit (MCL) of 15 picoCuries per liter.* The fourth round of groundwater sampling will include the wells in the third round. The DOE-RL letter to ANF will formalize the agreement (to collect groundwater samples) by the first of October.

Action Item #11EM1.46: WHC will prepare a draft letter for Bob Stewart to be sent to ANF to inform them of the fourth round of groundwater well sampling. Action: Steve Clark

6. John Stewart (USACE) described the process by which the Corps plans will be phased in. It was suggested that the Corps should have personnel on board as soon as possible so that they can be involved in the planning and conducting of the field activities with WHC in the lead role. The USACE will have two personnel available to assist in these activities by mid-October. Mr. Stewart said that the USACE would be involved in the comment disposition and incorporation for the Phase 1 report and would be prepared to take over all activity for the Feasibility Study Phase 3 report. The USACE is committed not to cause a schedule slip and to cause minimal disruption to DOE or to the contractors with their phasing into the 1100-EM-1 work.

7. Errata data sheets for the RI Phase I Report were distributed to the regulators and the meeting participants. Bob Stewart requested that a cover letter be prepared to transmit the revisions to section 4 of the Phase I report. These pages will be officially transmitted as soon as the cover letter is prepared.

8. WHC expects the RI Phase 2 report and the FS Phase 3 report to be delayed at least five months past the scheduled completion date of April 1992. The main cause of delay in the schedules is the hydrogeologic investigation in the area of Horn Rapids Landfill. Only the Stage 1 monitoring wells have been installed; the stage 2 wells must be installed in the future. *The issue of limitations on beginning non-intrusive Phase II work were discussed.*

Action Item #11EM1.47: Provide information to DOE-RL (Bob Stewart) regarding any Tri Party Agreement limitations on starting of non-intrusive work prior to approval of the 1100-EM-1 Work Plan Suppelement. Action: Dave Einan

Attachment #2

1100-EM-1 Unit Managers Meeting Agenda
September 19, 1990
450 Hills/Rm. 47/3000 Area

1. Introduction

2. Action Item Status

3. Work Progress

   - The RI Phase 1 Report was delivered to EPA and Ecology meeting the August 31, 1990, target date. Comments were requested by close of business on October 15, 1990.

   - The FS Phase 1 and 2 Report began joint review by DOE and WHC on September 7, 1990. Comments were requested by close of business on October 8, 1990.

   - The RI Phase 2 Work Plan Supplement will be delivered for parallel review by DOE, EPA, Ecology, and WHC on October 1, 1990.

   - The third round of groundwater monitoring well sampling was completed on September 6, 1990. The fourth round is scheduled for late November, 1990.

4. Schedule

5. Issues

   - Transition of 1100-EM-1 work to the Army Corps of Engineers.

   - Interaction with Advanced Nuclear Fuels in the Phase 2 Remedial Investigation.

6. Other Topics (as required)

   - Analyses to be requested from sampling of ANF wells.

7. Summary of Agreements and Commitments

Attachment #3

Attendance List
1100-EM-1 Unit Managers Meeting
September 19, 1990

Name	Organization	1100-EM-1 Responsibility	Phone
Stewart, R. K.	DOE-RL	Unit Manager	509-376-6192
Hildebrand, Doug	DOE-RL	EOB	509-376-2287
Cline, Chuck	Ecology	Geohydrologist	509-438-7556
Cross, Steve	Ecology	CERCLA Unit	206-459-6615
Einan, D.	EPA	Unit Manager	509-376-3883
Cheatham, Terry	ES	Sr. P. M.	509-943-0909
Moore, Vince	ES	Operations Mgr.	509-943-0909
Poyer Jones, Susan	ES	Regulatory Analyst	509-943-0909
Shangran, Tim	ES	Consultant	303-825-8100
Johnson, Laura	Golder	Consultant to WHC	206-883-0777
Wright, Bill	Golder	Consultant to WHC	206-883-0777
LaCombe, Donna	PRC	EPA Consultant	206-624-2692
Fassett, Doug	SWEC	GSSC for DOE/RL	509-376-3136
Miklancic, Fred	USACE	Env. Eng. Br.	509-522-6531
Stewart, John	USACE	Program Manager	509-522-6531
Drost, Brian	USGS	EPA Consultant	206-593-6510
Staubitz, Ward	USGS	EPA Consultant	206-593-6510
Ayres, Jeff	WHC	Tech. Coord.	509-376-3918
Bechtold, Becky	WHC	OSM Tech. Rep.	509-373-3448
Clark, Steve	WHC	OU Tech. Coord.	509-376-1513
Green, Bill	WHC	Env. Eng.	509-376-3886
Lauterbach, Merl	WHC	Env. Eng.	509-376-5257
Patterson, Jim	WHC	ER Programs	509-376-0568
Stalker, Kelly	WHC		509-376-2038

Attachment #4

Commitments/Agreements Status List
1100-EM-1 Operable Unit
September 19, 1990

Item No.	Action	Status
11EM1.42	The ARARs are in the process of being identified. An update will be presented at the next meeting. Action: S. Clark (7/17/90, 11EM1-UMM)	Closed ARARs briefing was presented at the 9/19/90 UMM, by Engineering Science, Inc. (10/16/90)
11EM1.43	DOE-RL and WHC to meet with EPA on August 7 to review radiological data to determine the need to include data in the report. Action: Merl Lauterbach. (7/17/90, 11EM1-UMM)	Closed The meeting took place on 8/07/90, radiological data has been delayed (the meeting minutes are included as Attachment #9 to the 8/19/90 UMM Minutes). (10/16/90)
11EM1.44	WHC is to work with Golder to prepare a concise summary of the work which is needed for the RI Phase 2 at ANF. The participation of ANF should be included in the summary. This will also include a discussion of the possible implications of the findings based on discussions with WHC attorneys. Action: M. Lauterbach (8/15/90, EM1-UMM)	Closed The draft summary letter was provided to Bob Stewart by WHC. A letter documenting ANF participation will be sent to ANF by DOE-RL by 9/19/90. The letter to ANF was delayed but was finally sent. (10/16/90)
11EM1.45	WHC will prepare a change request to bring the Work Plan Schedule and the TPA schedule into agreement. The Work Plan Schedule is to be redone to be similar to the schedules in other Work Plans. Action: J. Patterson (8/15/90, EM1-UMM)	Closed. Golder presentation addressed the Work Plan Schedule. The Work Plan Schedule is being revised as part of the Work Plan Supplement (9/19/90)
11EM1.46	WHC will prepare a draft letter for Bob Stewart to be sent to ANF to inform them of the fourth round of groundwater well sampling. Action: Steve Clark (9/19/90, EM1-UMM)	Open

11EM1.47	Provide information to DOE-RL (Bob Stewart) regarding any Tri Party Agreement limitations on starting of non-intrusive work prior to approval of the 1100-EM-1 Work Plan Suppelement. Action: Dave Einan (9/19/90, EM1-UMM)	Closed The information was provided. There is no limitation on beginning Phase II non-intrusive work prior to approval of the Work Plan Supplement. (10/16/90)

1100-EM-1 Operable Unit

SAMPLING OF GROUNDWATER MONITORING WELLS

Status Date: 9/14/90

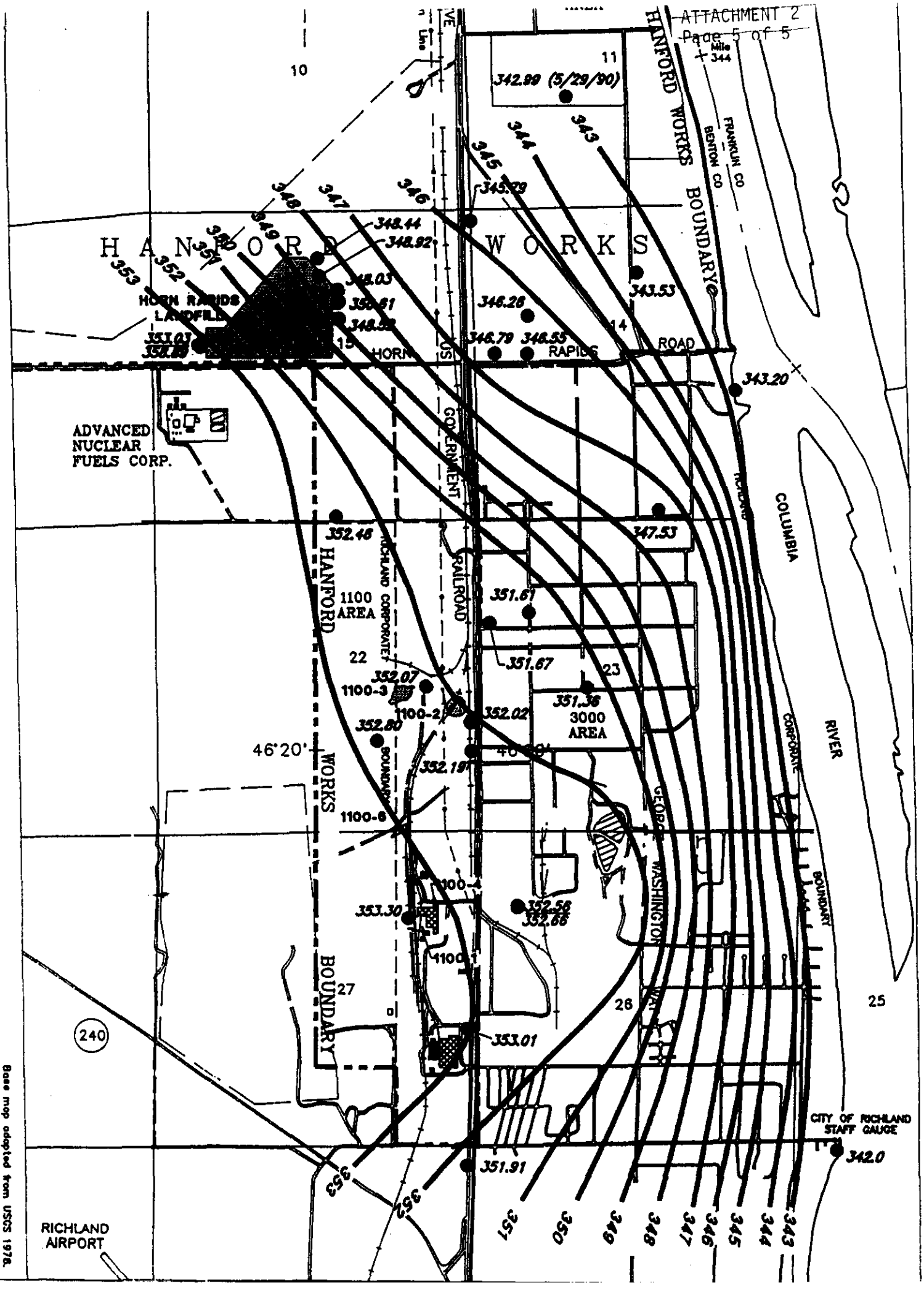
Temporary Well Number	Hanford Well Number	Sampling 1st Round Feb.,1990	2nd Round May, 1990	3rd Round Aug.,1990
MW-1	S41-E11	X	X	X
MW-2	S34-E10	X	X	X
MW-3	S41-E12	X	X	X
MW-4	S38-E12A	X	X	X
MW-5	S38-E12B	X	X	X
MW-6	S37-E11	X	X	X
MW-7	S38-E11	X	X	X
MW-8	S31-E08	X	X	X
MW-9	S32-E08	X	X	X
MW-10	S30-E10A	X	X	X
MW-11	S30-E10B	X	X	X
MW-12	S31-E10A	X	X	X
MW-13	S31-E10B	X	X	X
MW-14	S31-E10C	X	X	X
MW-15	S31-E10D	X	X	X
MW-17	S41-E13C	X	X	X
	S37-E14	X	X	X
	S40-E14	X	X	X
	S41-E13A	X	X	X
	S41-E13B	X	X	X
	S43-E12	X	X	X
	S27-E14		X	X
	S29-E12		X	X
	S30-E15A		X	X
	S31-E13		X	X
	S32-E13A		X	X
Well Field(W)	Composite	X	X	X
Well Field(E)	Composite	X	X	X
ANF Well # 14			X	X
ANF Well # 15			X	X
ANF Well # 16			X	X

1100-EM-1 Operable Unit

RADIOCHEMICAL ANALYSES OF GROUND WATER MONITORING WELL SAMPLES

Temporary Well Number	Hanford Well Number	Gross Alpha, pCi/l 1st Round Feb.,1990	Gross Alpha, pCi/l 2nd Round May, 1990	Gross Beta, pCi/l 1st Round Feb.,1990	Gross Beta, pCi/l 2nd Round May, 1990
MW-1	S41-E11	8.4	2.0	12.7	3.5
MW-2	S34-E10	4.4	-	8.2	7.3
MW-3	S41-E12	17.0	1.7	14.7	7.9
MW-4	S38-E12A	2.9	-	7.4	-
MW-5	S38-E12B	3.9	1.8	6.5	6.1
MW-6	S37-E11	3.6	1.9	-	-
MW-7	S38-E11	4.8	0.6	6.1	1.4
MW-8	S31-E08	3.8	-	5.3	2.4
MW-9	S32-E08	1.3	-	6.4	1.6
MW-10	S30-E10A	11.9	2.2	30.2	85.2
MW-11	S30-E10B	12.2	2.4	35.2	86.5
MW-12	S31-E10A	7.6	4.8	34.6	87.6
MW-13	S31-E10B	9.1	4.1	28.8	71.0
MW-14	S31-E10C	6.3	4.9	25.1	89.4
MW-15	S31-E10D	9.3	1.6	23.2	51.4
MW-17	S41-E13C	2.2	0.9	5.6	0.9
	S27-E14		1.6		19.7
	S29-E12		1.6		1.0
	S30-E15A		-		2.5
	S31-E13		-		2.4
	S32-E13A		-		1.9
	S37-E14	2.2	-	-	-
	S40-E14	1.1	-	-	-
	S41-E13A	-	-	0.9	1.3
	S41-E13B	6.0	3.7	4.9	9.4
	S43-E12	2.6	1.9	8.8	8.3
ANF Well # 14			5.3		6.5
ANF Well # 15			37.0		126.7
ANF Well # 16			10.0		58.4
Well Field(E)	Composite	-	-	-	-
Well Field(W)	Composite	1.0	-	-	-

Maximum Contaminant Levels (MCL) for Radionuclides per 40 CFR 141, EPA 1986a:
Gross Alpha . . . . 15 pCi/l
Gross Beta . . . . 50 pCi/l



Base map adapted from USGS 1978.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Presented by:

Susan Poyer Jones
Engineering-Science, Inc.

99th Congress
2d Session

COMMITTEE PRINT

S. Prt.
99-217

THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 (SUPERFUND) (P.L. 96-510)

AS AMENDED BY

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (P.L. 99-499)

DECEMBER 1986

Printed for the use of the Senate Committee
on Environment and Public Works

U.S. GOVERNMENT PRINTING OFFICE
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SEC. 121. CLEANUP STANDARDS

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(e) PERMITS AND ENFORCEMENT.--(1) No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely onsite, where such remedial action is selected and carried out in compliance with this section.

(2) A State may enforce any Federal or State standard, requirement, criteria, or limitation to which the remedial action is required to conform under this Act in the United States district court for the district in which the facility is located...

Hanford Federal Facility

Agreement and Consent Order

by

Washington State
Department of Ecology

United States
Environmental Protection Agency

United States
Department of Energy

May 1989
89-10

ARTICLE XVII. PERMITS

54. The Parties recognize that under CERCLA Secs. 121(d) and 121 (e)(1), and the NCP, portions of the response actions called for by this Agreement and conducted entirely on the Hanford Site are exempted from the procedural requirement to obtain federal, state, or local permits, but must satisfy all the applicable or relevant and appropriate federal and state standards, requirements, criteria or limitations which would have been included in any such permit.

DEFINITIONS

- ☐ Applicable Requirements

Or

- ☐ Relevant And Appropriate Requirements

- ☐ To-Be-Considered Material

TYPES OF ARARs

- Chemical-Specific - health - or risk-based numerical values or risk assessment methods.

- Action-Specific - performance, design, or other activity-based requirements.

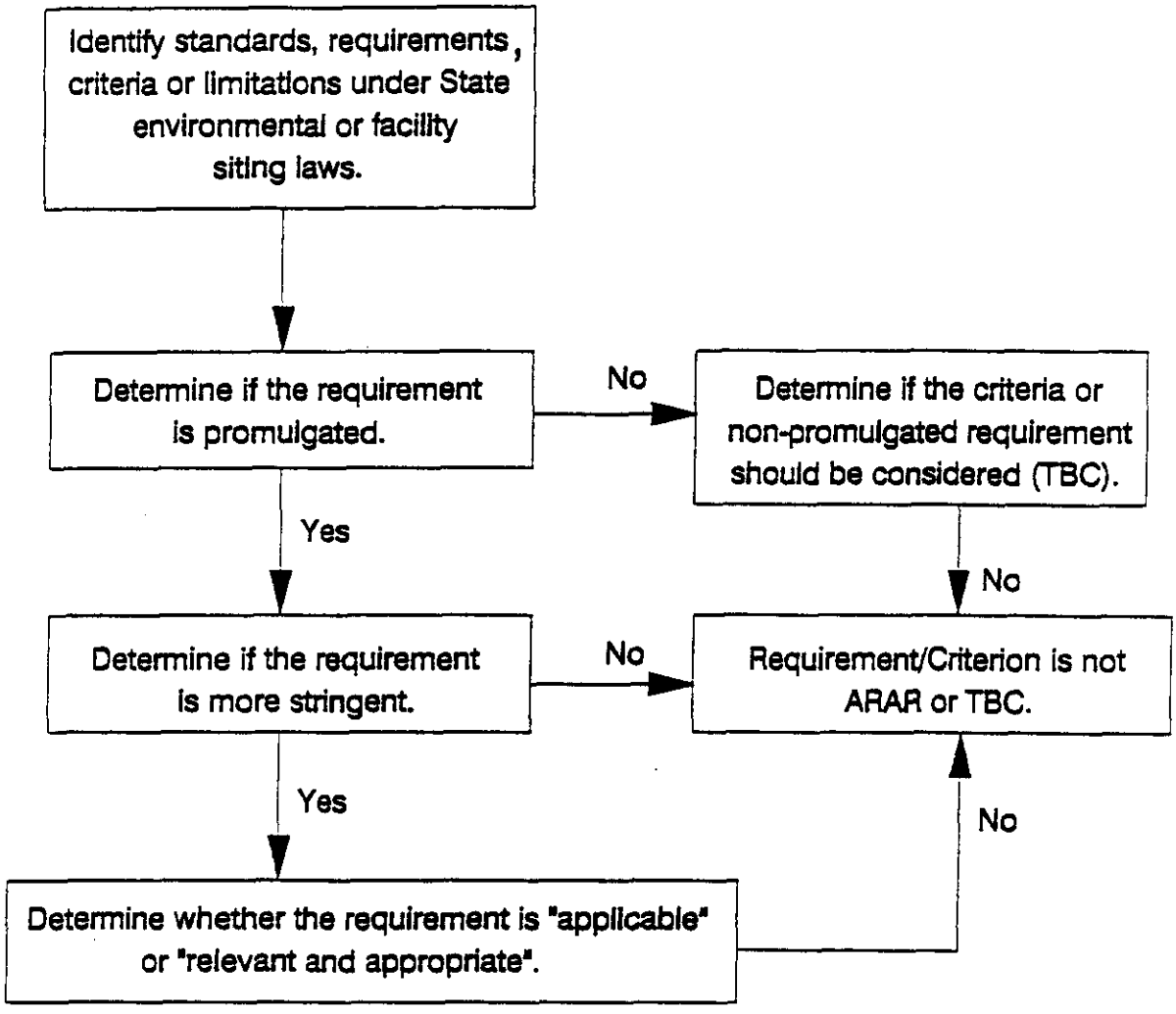
- Location-Specific - restrictions placed on the concentration of hazardous substances or the conduct of activities because the location is particularly sensitive.

EXHIBIT 1-3
SELECTED ACTION-SPECIFIC POTENTIAL ARARs

ACTION	REQUIREMENTS	PREREQUISITES FOR APPLICABILITY	CITATION
CHAPTER 4-MANAGEMENT OF RADIOACTIVE WASTES			
Discharge of Radioactive Pollutants to Air	Airborn emissions shall not cause members of the public to receive doses greater than: . 25 mrem/yr to the whole body; or . 75 mrem/yr to the critical organ.	Applicable to airborne emissions from DOE, NRC-licensed, and non-DOE Federal facilities during their operational period. Not applicable to: doses caused by radon-220, radon 222, and their respective decay products; facilities regulated under 40 CFR Parts 190, 191, or 192; and low-energy accelerators and users of sealed radiation sources.	Clean Air Act (CAA) 40 CFR Part 61, Subparts H and I.

Source: Draft CERCLA Compliance With Other Laws Manual (Part II), August, 1989.

Determining Eligibility of State ARARs



WHEN ARARs ARE IDENTIFIED

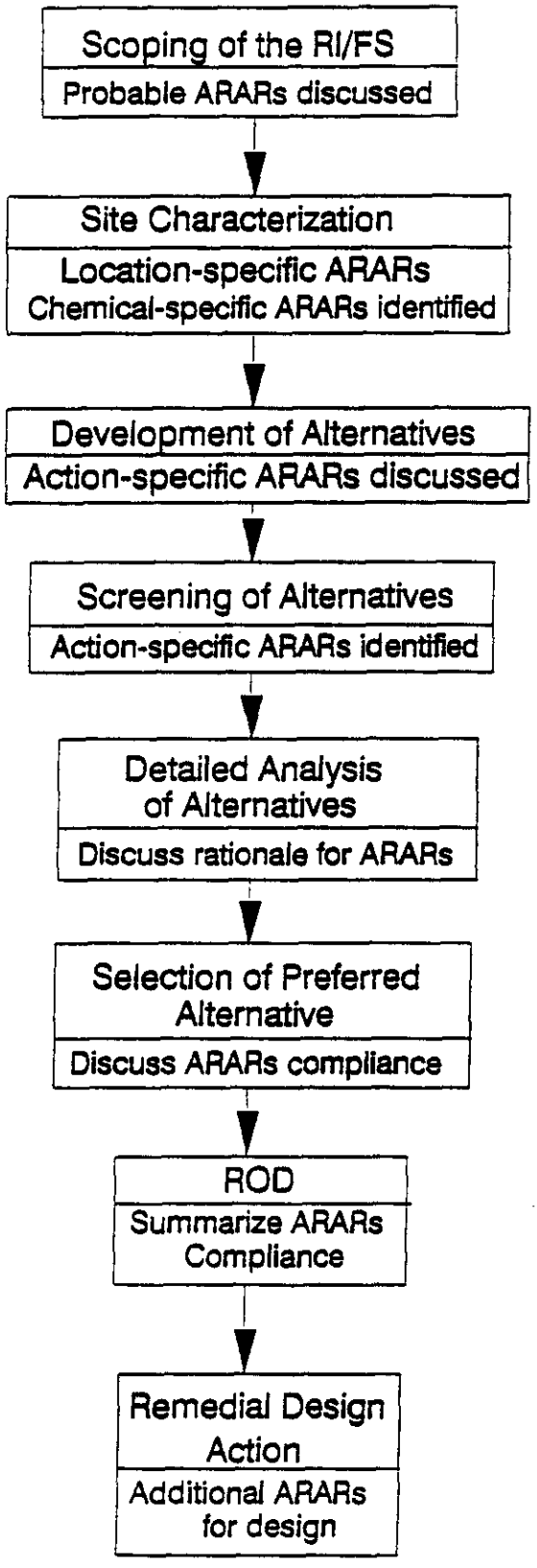


Table A-1. Potential Federal and State Applicable and Appropriate Requirements (ARARs) and To Be Considered (TBCs). (sheet 6 of 6)

CODE NUMBER	CODE TITLES
WAC 173-563	Instream Resources Protection Program Main Stem Columbia River in Washington
WAC 173-806	State Environmental Policy Act Procedures
WAC 197-11	State Environmental Policy Act Rules
WAC 220-32	Columbia River
WAC 220-110	Hydraulic Code Rules
WAC 232-12-011	Wildlife Classified as Protected Wildlife
WAC 232-12-14	Wildlife Classified as Endangered Species
WAC 248-54-175	Maximum Contaminant Levels
WAC 296-24	General Safety and Health Standards
WAC 296-62	Occupational Health Standards
WAC 296-63	Right-to-Know Fee Assessment
WAC 296-65	Asbestos Removal and Encapsulation
WAC 508-12	Administration of Surface and Ground Water Codes
WAC 508-64	Measuring Devices for Water Withdrawal Facilities
General Regulation 80-7	Benton-Franklin-Walla-Walla Counties Air Pollution Control Authority
City of Richland Ordinance No. 35-84	Discharge of Liquid Effluent to Richland's Public Owned Treatment Works
American Conference of Governmental Industrial Hygienists (ACGIH)	Threshold Limit Values and Biological Exposure Indices for 1989-1990

Table A-2. Preliminary List of Applicable or Relevant and Appropriate Requirements.
(sheet 1 of 26)

ARAR Requirement	Applicable	Potentially Relevant and Appropriate	To Be Considered	Rationale
1.0 Chemical Specific				
1.1 40 CFR 116 Designation of Hazardous Substances 40 CFR 302 List of Hazardous Substances and Reportable Quantities	X			The following contaminants of concern are listed as hazardous substances. Arsenic and arsenic compounds Cadmium and cadmium compounds Chlordane Chromium and Chromium compounds Lead bis(2-ethylhexyl)phthalate Polychlorinated biphenyls Tetrachloroethane Trichloroethene 1,1,1-trichloroethane
1.2 Safe Drinking Water Act (SDWA) 42 U.S.C 300 (f), 40 CFR part 141, 40 CFR part 142, 40 CFR part 143, 40 CFR part 146, and Washington Administration Code (WAC) 248-54		X		Ground water is not used for drinking water and institutional controls can prevent future use. However, there is a potential for discharge of contaminated ground water to the Columbia River, which is used for drinking water. Also, underground sources that could be used must be protected from any underground injection that will endanger the drinking water source. Maximum Contaminants Levels (MCL) for the contaminants of concern found in the soil and ground water are (volumes mg/l are: Arsenic 0.05 Cadmium 0.01 Chromium 0.05 Lead 0.05 Nitrate 10.0 1,1,1 trichloroethane 0.2 Trichloroethene 0.005

WAIVERS OF ARARs

- ☐ Interim Measures
- ☐ Greater Risk to Health and the Environment
- ☐ Technical Impracticability
- ☐ Equivalent Standard of Performance
- ☐ Inconsistent Application of State Requirements
- ☐ Funding Balance

REFERENCES

CERCLA Compliance With Other Laws Manual, Draft Guidance, August 8, 1988, OSWER Directive 9234.1-01

CERCLA Compliance With Other Laws Manual: Part II. Clean Air Act and Other Environmental Statutes and State Requirements, August 1989, EPA/540/G-89/009, OSWER Directive 9234.1-02

40 CFR Part 300 National Oil and Hazardous Substances Pollution Contingency Plan (March 8, 1990 Federal Register)

Hanford Site Environmental Program Directory, U.S. DOE, Richland Operations Office, DOE-RL 88-17

PRELIMINARY DRAFT
SEPTEMBER 19, 1990

1100-EM-1 PHASE II REMEDIAL INVESTIGATION WORK PLAN SCHEDULE MAJOR ASSUMPTIONS

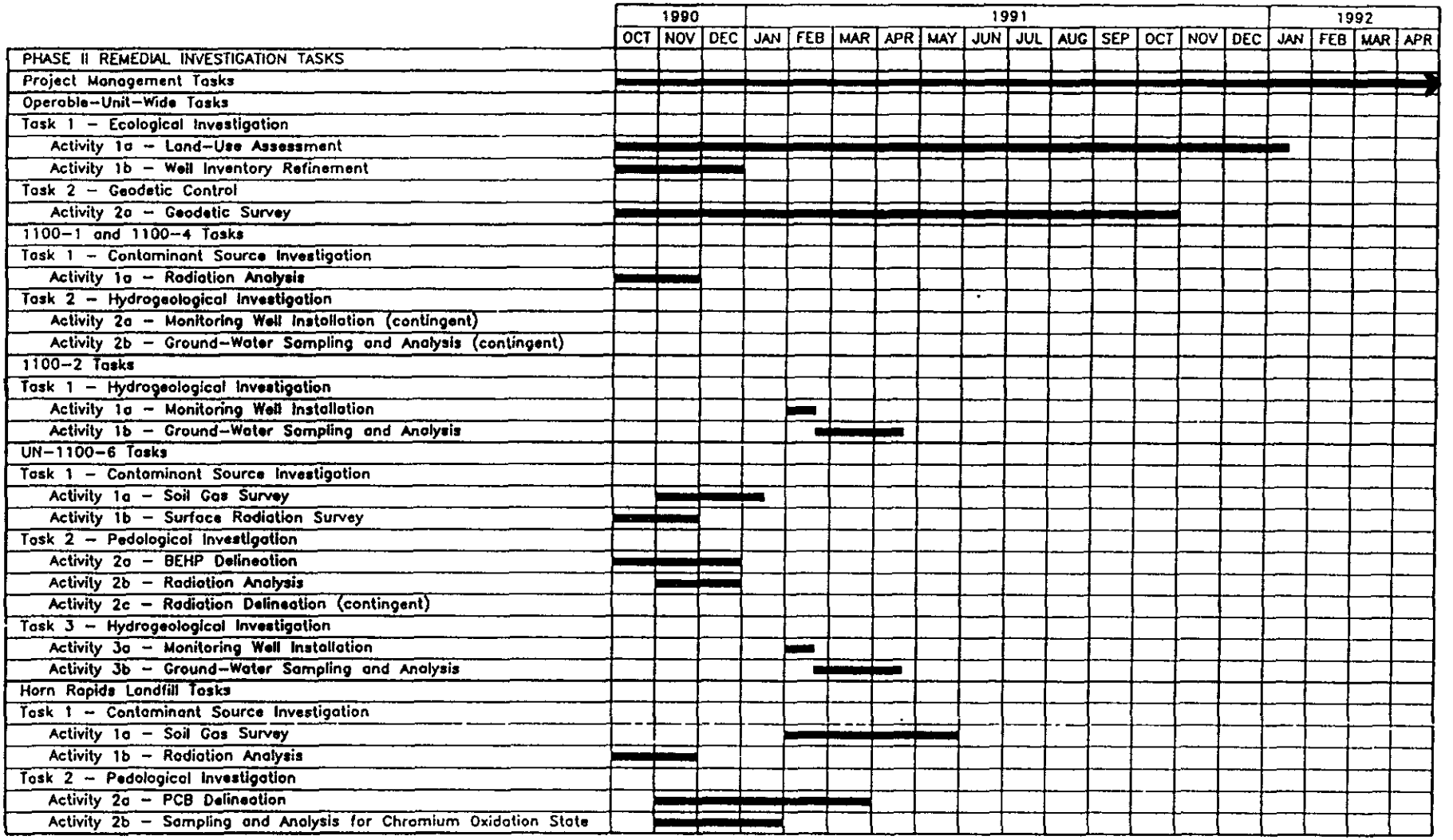
Only Stage 1 monitoring wells are installed at 1100-2 and UN-1100-6.

1100-1, 1100-4, UN-1100-6, and Horn Rapids Landfill soils are not sources of radiation contamination in the 1171 Building vicinity ground water.

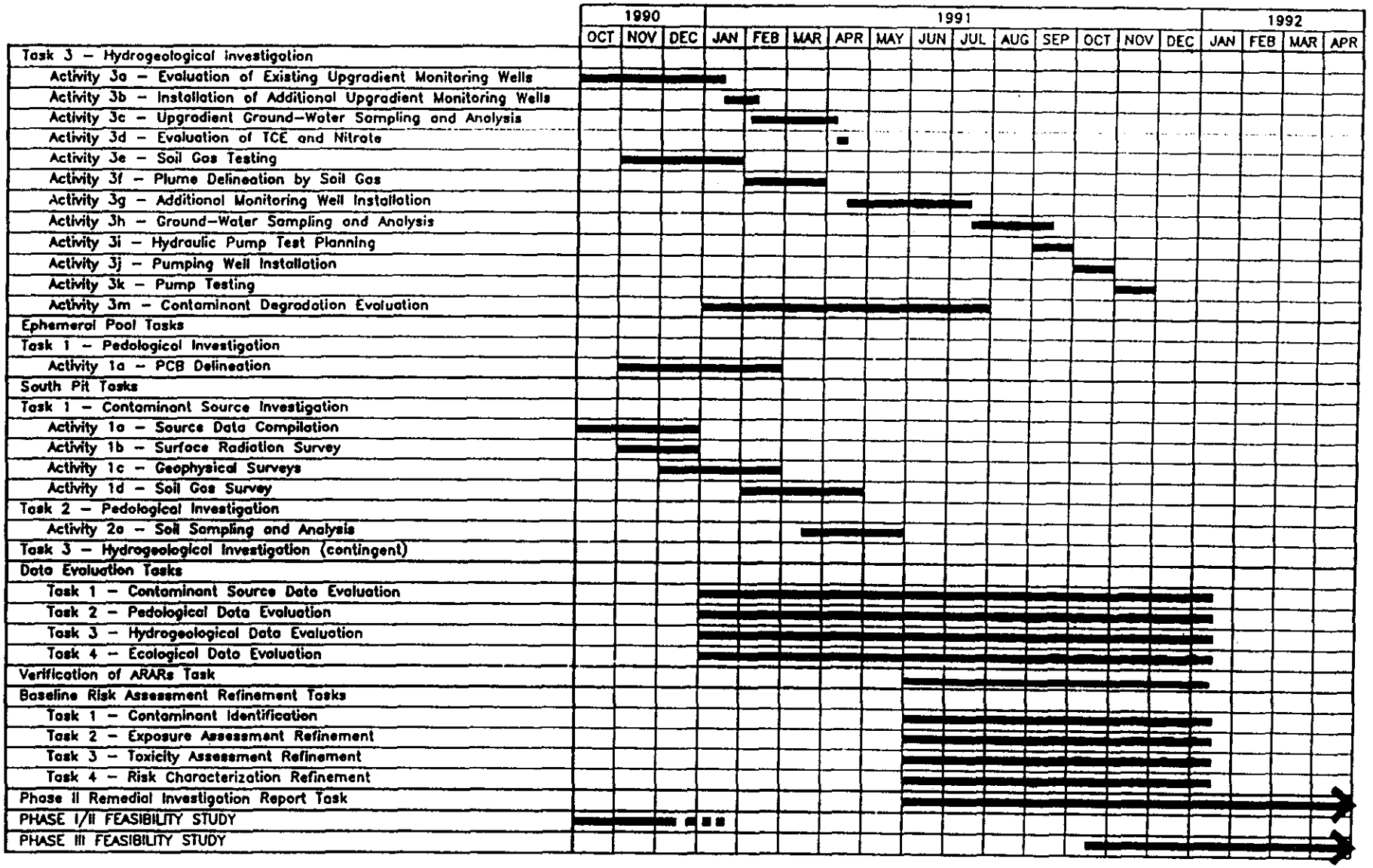
Horn Rapids Landfill is a contributor to ground-water contamination, and only Stage 1 monitoring wells are installed.

The upper confined aquifer is not impacted by any of the operable subunits.

Three drilling rigs are used.



Preliminary Draft Schedule for the 1100-EM-1 Operable Unit Phase II Remedial Investigation and Feasibility Study



Preliminary Draft Schedule for the 1100--EM-1 Operable Unit Phase II Remedial Investigation and Feasibility Study

Table 4-7. Inorganic UTLs for Background Soils.

Parameter	Surface (n=9) (µg/kg)	Subsurface (n=12) (µg/kg)
aluminum	7,870	6,235
antimony	3.7 *	3.1 *
arsenic	3.21	2.92
barium	97.9	236
beryllium	0.65	0.28
cadmium	0.78	0.36 *
calcium	4,530	7,830
chromium	11.7	47.3
cobalt	15.3	16.8
copper	16.3	19.5
iron	27,000	29,400
lead	13.6	5.03
magnesium	5,760	4,680
manganese	472	355
mercury	0.1 *	0.1 *
nickel	15.2	25.9
potassium	1,790	967
selenium	0.39 *	0.41 *
silver	2.3	0.54 *
sodium	112	420
thallium	0.39 *	0.41 *
vanadium	73.5	115
zinc	53.3	50.5
cyanide	0.52 *	0.51 *

*Parameter was never detected in the respective background samples; therefore, the highest reported respective background SQL is substituted as a surrogate UTL.

Table 4-8. Organic UTLs for Background Soils.
(Sheet 1 of 4)

Parameter	Surface (n=9) (µg/kg)		Subsurface (n=12) (µg/kg)	
Volatiles				
chloromethane	11	*	11	*
bromomethane	11	*	11	*
vinyl chloride	11	*	11	*
chloroethane	11	*	11	*
methylene chloride	5	*	5	*
acetone	43	*	22	*
carbon disulfide	5	*	5	*
1,1-dichloroethene	5	*	5	*
1,1-dichloroethane	5	*	5	*
1,2-dichloroethene (total)	5	*	5	*
chloroform	5	*	5	*
1,2-dichloroethane	5	*	5	*
2-butanone	11	*	11	*
1,1,1-trichloroethane	5	*	5	*
carbon tetrachloride	5	*	5	*
vinyl acetate	11	*	11	*
bromodichloromethane	5	*	5	*
1,2-dichloropropane	5	*	5	*
cis-1,3-dichloropropene	5	*	5	*
trichloroethene	5	*	5	*
dibromochloromethane	5	*	5	*
1,1,2-trichloroethane	5	*	5	*
benzene	5	*	5	*
trans-1,3-dichloropropene	5	*	5	*
bromoform	5	*	5	*
4-methyl-2-pentanone	11	*	11	*
2-hexanone	11	*	11	*
tetrachloroethene	5	*	5	*
1,1,2,2-tetrachloroethane	5	*	5	*
toluene	5	*	5	*
chlorobenzene	5	*	5	*
ethylbenzene	5	*	5	*
styrene	5	*	5	*
xylene (total)	5	*	5	*
Semivolatiles				
phenol	38,100		350	*
bis(2-chloroethyl)ether	690	*	350	*
2-chlorophenol	690	*	350	*
1,3-dichlorobenzene	690	*	350	*
1,4-dichlorobenzene	690	*	350	*
benzyl alcohol	690	*	350	*

Table 4-8. Organic UTLs for Background Soils.
(Sheet 2 of 4)

Parameter	Surface (n=9) (µg/kg)		Subsurface (n=12) (µg/kg)	
Semivolatiles (cont.)				
1,2-dichlorobenzene	690	*	350	*
2-methylphenol	690	*	350	*
bis(2-chloroisopropyl)ether	690	*	350	*
4-methylphenol	690	*	350	*
N-nitroso-di-n-propylamine	690	*	350	*
hexachloroethane	690	*	350	*
nitrobenzene	690	*	350	*
isophorone	690	*	350	*
2-nitrophenol	690	*	350	*
2,4-dimethylphenol	690	*	350	*
benzoic acid	3,300	*	1,700	*
bis(2-chloroethoxy)methane	690	*	350	*
2,4-dichlorophenol	690	*	350	*
1,2,4-trichlorobenzene	690	*	350	*
naphthalene	690	*	350	*
4-chloroaniline	690	*	350	*
hexachlorobutadiene	690	*	350	*
4-chloro-3-methylphenol	690	*	350	*
2-methylnaphthalene	690	*	350	*
hexachlorocyclopentadiene	690	*	350	*
2,4,6-trichlorophenol	690	*	350	*
2,4,5-trichlorophenol	3,300	*	1,700	*
2-chloronaphthalene	690	*	350	*
2-nitroaniline	3,300	*	1,700	*
dimethylphthalate	690	*	350	*
acenaphthylene	690	*	350	*
2,6-dinitrotoluene	690	*	350	*
3-nitroaniline	3,300	*	1,700	*
acenaphthene	690	*	350	*
2,4-dinitrophenol	3,300	*	1,700	*
4-nitrophenol	3,300	*	1,700	*
dibenzofuran	690	*	350	*
2,4-dinitrotoluene	690	*	350	*
diethylphthalate	690	*	350	*
4-chlorophenyl-phenylether	690	*	350	*
fluorene	690	*	350	*
4-nitroaniline	3,300	*	1,700	*
4,6-dinitro-2-methylphenol	3,300	*	1,700	*
N-nitrosodiphenylamine (1)	690	*	350	*
4-bromophenyl-phenylether	690	*	350	*
hexachlorobenzene	690	*	350	*
pentachlorophenol	3,300	*	1,700	*
phenanthrene	690	*	350	*

Table 4-8. Organic UTLs for Background Soils.
(Sheet 3 of 4)

Parameter	Surface (n=9) (µg/kg)		Subsurface (n=12) (µg/kg)	
Semivolatiles (cont.)				
anthracene	690	*	350	*
di-n-butylphthalate	690	*	350	*
fluoranthene	690	*	350	*
pyrene	690	*	350	*
butylbenzylphthalate	690	*	350	*
3,3'-dichlorobenzidine	1,400	*	710	*
benzo(a)anthracene	690	*	350	*
chrysene	690	*	350	*
bis(2-ethylhexyl)phthalate	690	*	350	*
di-n-octylphthalate	690	*	350	*
benzo(b)fluoranthene	690	*	350	*
benzo(k)fluoranthene	690	*	350	*
benzo(a)pyrene	690	*	350	*
indeno(1,2,3-cd)pyrene	690	*	350	*
dibenz(a,h)anthracene	690	*	350	*
benzo(g,h,i)perylene	690	*	350	*
Pesticides				
alpha-BHC	17	*	17	*
beta-BHC	17	*	17	*
delta-BHC	14		17	*
gamma-BHC (lindane)	17	*	17	*
heptachlor	17	*	17	*
aldrin	17	*	17	*
heptachlor epoxide	17	*	17	*
endosulfan I	17	*	17	*
dieldrin	33	*	34	*
4,4'-DDE	33	*	34	*
endrin	33	*	34	*
endosulfan II	33	*	34	*
4,4'-DDD	33	*	34	*
endosulfan sulfate	33	*	34	*
4,4'-DDT	33	*	34	*
methoxychlor	170	*	170	*
endrin ketone	33	*	34	*
alpha-chlordane	170	*	170	*
gamma-chlordane	160		170	*
toxaphene	330	*	340	*
aroclor-1016	170	*	170	*
aroclor-1221	170	*	170	*
aroclor-1232	170	*	170	*
aroclor-1242	170	*	170	*

**Table 4-8. Organic UTLs for Background Soils.
(Sheet 4 of 4)**

Parameter	Surface (n=9) (µg/kg)		Subsurface (n=12) (µg/kg)	
Pesticides (cont.)				
aroclor-1248	170	*	170	*
aroclor-1254	330	*	340	*
aroclor-1260	330	*	340	*

*Parameter was never detected in the respective background samples; therefore, the highest reported respective background SQL is substituted as a surrogate UTL.

- 1100-1 Subsurface Soil Contaminants
  - Inorganic contaminants

    arsenic
    copper
    iron
    lead
    mercury
    potassium
    sodium
    vanadium
    zinc

  - Organic contaminants

    none encountered

Calcium, iron, magnesium, potassium, and sodium are essential human nutrients considered to be non-toxic at the concentrations encountered within the operable subunit soils (EPA 1989d). Toxicity data are currently insufficient to estimate an RfD for copper, and the substance is not a known carcinogen (EPA 1989c). However, copper is an essential plant micronutrient and the maximum concentration encountered does not exceed its normal range in soils (5 to 150 mg/kg) within the United States (Brady 1974); Copper is therefore eliminated from further consideration as a contaminant of potential concern for the 1100-1 operable subunit.

The preliminary toxicity screening for the remaining soil contaminants at the operable subunit is summarized in Table 4-9. The only contaminant of potential concern is arsenic, found one time at approximately 2 m (6 ft) below the ground surface (at a concentration that barely exceeds background, see

Table 4-9. Preliminary Toxicity Screening for Soil Contaminants at the 1100-1 Operable Subunit.

Parameter	Maximum Soil Concentration (mg/kg)	Oral RfD (mg/kg/d)	Soil Concentration at the Oral RfD (mg/kg)	Inhalation RfD (mg/kg/d)	Soil Concentration at the Inhalation RfD (mg/kg)	Oral SF $(mg/kg/d)^{-1}$	Soil Concentration at Oral ICR = 1E-06 (mg/kg)	Inhalation SF $(mg/kg/d)^{-1}$	Soil Concentration at Inhalation ICR = 1E-06 (mg/kg)	Regulatory Soil Cleanup Guidelines (mg/kg)
arsenic	8.2	1.0E-03[b]	77	--	--	1.7[d]	0.61	5.0E+01[c]	3.6	--
lead	266.0	--	--	--	--	--	--	--	--	500-1,000[c]
mercury	0.25	3.0E-04[b]	23	--	--	--	--	--	--	--
nickel	20.9	2.0E-02[a]	1,500	--	--	--	--	8.4E-01[b]	220	--
vanadium	118.0	7.0E-03[b]	540	--	--	--	--	--	--	--
zinc	100.0	2.0E-01[b]	15,000	--	--	--	--	--	--	--

[a] EPA 1990a.
[b] EPA 1989c.
[c] EPA 1989f.
[d] Surrogate based on proposed arsenic unit risk of 5E-05 µg/L (EPA 1990a).
-- Not available.

Note: Shaded areas indicate screening criterion exceeded.

in Section 7 to obtain radium readings from archived soil samples obtained from the 1100-1 and 1100-4 operable subunits during the first phase of the RI.

Antimony: Elevated antimony was encountered only during the first round of monitoring in a single well, MW-1, which is located west of the 1100-1 operable subunit (see Figure 2-18). The concentration observed was barely above discernable background levels (see Table 4-18). As available ground-water potential data indicate that this well is hydraulically upgradient of the Battery Acid Pit (see Figures 3-38 through 3-40), and no antimony was detected within the soil column of the operable subunit, the source of this contamination can not currently be determined. Antimony was detected within the saturated soils beneath the 1100-3 operable subunit (see Section 4.4.4), but was not present in elevated concentrations in any of the wells located near the subunit (see Table 4-21).

As no operable unit source of antimony contamination can be documented with existing data, the substance is eliminated from further consideration as a contaminant of potential concern for 1100-EM-1 ground waters.

Arsenic: Elevated arsenic ground-water concentrations were found, in the first round of monitoring only, in the confined aquifer well, MW-17, at a level of 2.5 µg/L (see Table 4-21). Only one background well, MW-9, was used to characterize conditions in the confined aquifer (see Section 4.5.1), and the UTL for arsenic is calculated to be 1 µg/L (see Table 4-18). However, Appendix N indicates that the arsenic results for MW-9 were 1 and 2 U µg/L for the first and second monitoring rounds, respectively. Because half the SQL is substituted for nondetected values in the statistical calculations in this report (see Section 4.4.1), the arsenic distribution in MW-9 becomes artificially invariable. Any variability at all in the MW-9 arsenic data (e.g., 1 and 0.9 µg/L) would have yielded a UTL above the concentration detected at MW-17 in the first round of sampling.

Given the above information, the lack of verification from the second round monitoring results, and the lack of elevated arsenic in any of the unconfined aquifer wells in the vicinity of MW-17, arsenic is not regarded as a ground-water contaminant of concern for the 1100-EM-1 Operable Unit. Elevated arsenic (with respect to vadose-zone soils) was found in a single saturated soil sample obtained at the 1100-4 operable subunit (see Section 4.4.5). Given the absence of any positive evidence of elevated arsenic in ground water in the vicinity of the Antifreeze Tank Site, arsenic is also not regarded as a soil contaminant of concern for this operable subunit.

Cadmium: Cadmium was detected at elevated concentrations that exceed the CFWQC, during only the first round of monitoring, in wells MW-6 and 699-S41-E13B (see Tables 4-21 and 4-23). Both of these wells are screened within the unconfined aquifer (see Table 2-1). The 1100-3 operable subunit is monitored primarily by MW-6. Well MW-6 is also located near the 1100-2 operable subunit; however, it is hydraulically upgradient from this subunit, based on presently available ground-water potential data (see Figures 3-38 through 3-40). Elevated cadmium was not found within the soil column of either subunit (see Sections 4.4.3 and 4.4.4).

Monitoring well 699-S41-13B is located approximately 450 m (1,500 ft) downgradient from the 1100-1 operable subunit (see Figures 3-38 through 3-40).

However, unconfined wells MW-3 and 699-S41-E13A do not display cadmium contamination (see Table 4-21).

The source of cadmium ground-water contamination is therefore unknown and can not be attributed to the operable unit with existing data. Cadmium, therefore, is not regarded as a contaminant of potential concern for the 1100-EM-1 ground-water medium.

Copper: Elevated copper, in concentrations exceeding the CFWQC, was encountered only within the City of Richland well field distribution lines (see Tables 4-18 and 4-23). There is no known operable unit source of the copper found in the well field. The well field is generally downgradient from the 1100-1, 1100-4, and UN-1100-6 operable subunits (see Figures 3-38 through 3-40).

However, copper was not identified as a soil contaminant at any of these subunits (see Sections 4.4.2, 4.4.5, and 4.4.6). In addition, none of the wells located between these subunits and the well field show any indication of copper contamination (see Table 4-21). This information indicates that the copper may have originated from the well field system—e.g., from metals in structures such as wells, pumps, or affiliated piping—rather than from the ground water. As a result, copper is not regarded as an operable unit ground-water contaminant of concern.

Iron: Iron was found at concentrations exceeding background levels, the CFWQC, the 2° MCL, and the HWQWC in a single well, MW-3, during the first round of monitoring only (see Tables 4-21 and 4-23). Some elevated iron was encountered in the subsurface soils of the Battery Acid Pit (1100-1, see Section 4.4.2). However, it is likely that the increased levels of iron observed in MW-3 are associated with the generally deteriorated ground-water quality in the vicinity of the 1171 Building, as mentioned above in the SC and TDS discussion.

Given that iron is an essential nutrient, the relatively small magnitude of the elevated concentration, that the 2° MCL and HWQWC were established on a strictly welfare basis (EPA 1986a) (e.g., to prevent discoloration of plumbing fixtures and laundry), the distance to the Columbia River, the volume of discharge to the river, and the absence of confirmation from the second round monitoring results, iron is not regarded as an 1100-EM-1 Operable Unit ground-water contaminant of concern.

Nickel: Four wells—MW-1, -3, -5, and 699-S41-E13A (see Table 4-21)—were found to contain elevated levels of nickel—all in excess of the HWQHC, and one in excess of the CFWQC (see Table 4-23). However, no operable unit source of this substance is known, as no elevated nickel concentrations were found in the soils at any of the operable subunits except for the Horn Rapids Landfill (see Section 4.4.7) and the Battery Acid Pit (1100-1, see Section 4.4.2). Since the elevated nickel concentrations at the 1100-1 subunit were confined to the surface soils, and the Horn Rapids Landfill is not in the vicinity of any of the wells displaying nickel contamination (see Figures 2-19 and 3-38 through 3-40), nickel is not considered to be a ground-water contaminant of concern for the operable unit.

bis(2-Ethylhexyl)phthalate: The phthalate ester BEHP was observed at elevated levels in two wells, 699-S30-15A and 699-S31-E13, that are located

well to the east of the operable unit, between the 3000 and 300 Areas (see Figure 2-19 and Table 4-22). Both observations exceed the concentration at the oral ICR of 1E-06 and the CFWQC, and the concentration in the latter well also far exceeds the concentration at the oral RfD and the HWQHC (see Table 4-23).

The UN-1100-6 operable subunit is the only 1100-EM-1 subunit or location known to contain BEHP in soils (see Section 4.4.6). As the two wells in question are approximately 2.4 km (1.5 mi) and mostly crossgradient from UN-1100-6 (see Figures 3-38 through 3-40), and none of the intervening wells display BEHP contamination (see Table 4-22), BEHP is not regarded as an operable unit ground-water contaminant of concern.

Tetrachloroethene: A single well, MW-4, shows indications of low level tetrachloroethene contamination. A concentration of 1 µg/L was observed during both monitoring rounds (see Table 4-22); this concentration exceeds both the concentration at the oral ICR of 1E-06 and the HWQHC (see Table 4-23).

Well MW-4 is screened within the upper portion of the unconfined aquifer, mostly crossgradient of the Paint and Solvent Pit (1100-2) (see Table 2-1 and Figures 2-18 and 3-38 through 3-40). Tetrachloroethene was also found at significant concentrations in the soil gas in a localized portion of the 1100-2 operable subunit (see Section 4.1.1.2 and Figure 4-1). The Paint and Solvent Pit may therefore be the source of this contamination, but the extent is by no means yet defined.

All of the above information indicates that tetrachloroethene, near the 1100-2 Paint and Solvent Pit, is the sole contaminant of potential concern for 1100-EM-1 ground waters (i.e., it is the only contaminant failing the preliminary screening criteria that appears, on the basis of existing data, to be attributable to waste management units assigned to the 1100-EM-1 Operable Unit). There are two other areas of ground-water contamination in the vicinity of the operable unit that may well not be associated with the operable unit, and can not, with existing data, be so attributed. These two areas include a general deterioration of ground-water quality in the vicinity of the 1171 Building (i.e., the 1100-EM-2 Operable Unit, see Sections 1.3, 3.1.3.1, 4.1.2.1, and Figure 1-2), and a known contaminant plume originating upgradient of the Horn Rapids Landfill, possibly from facilities associated with the Advanced Nuclear Fuels Corp. complex (see Section 4.1.2.4).

The area of deteriorated ground water near the 1171 Building, the source and extent of which has yet to be defined, is not considered further in this report, other than for recommendations in Section 7 for Phase II RI activities to confirm that nearby 1100-EM-1 operable subunits are not associated with the problem. An evaluation of the known plume in the Horn Rapids Landfill vicinity is provided below and in subsequent sections of this report. This evaluation was conducted immediately after the first round of ground-water monitoring data became available; landfill-specific background data were not available at that time. Without such data, two substances, trichloroethene and nitrate, were identified as contaminants of potential concern.

The landfill vicinity plume evaluation is preserved in this report for information purposes only. Although the evaluation is based on the assumption of a contributing landfill source of trichloroethene and nitrate, its

inclusion should not be construed, on the basis of existing data, to indicate either an 1100-EM-1 Operable Unit source, or any other DOE-RL source, of this contamination.

Within the plume, both trichloroethene and nitrate, greatly exceed their respective 1° MCLs of 0.005 and 44 mg/L (40 CFR 141, see Appendix N). Thus, the plume is discussed in relation to these two contaminants, on the basis of first round monitoring data only. Appendix N shows that the concentrations for both contaminants observed in the wells located downgradient from the Horn Rapids Landfill were not appreciably different in the second round as compared to the first.

Trichloroethene and nitrate contamination, as shown respectively in Figures 4-13 and 4-14, are encountered only within the vicinity of the Horn Rapids Landfill. The Horn Rapids Landfill is monitored on its northeastern, hydraulically-downgradient side by six monitoring wells, MW-10 through MW-15 (see Figure 2-18). Each of these wells is screened within the water table with the exception of MW-14, which is screened toward the bottom of the unconfined aquifer (see Table 2-1). The trichloroethene concentrations encountered near the landfill in the first round of sampling ranged up to 92 µg/L; the nitrate concentrations up to 217 mg/L (see Appendix N).

4.6 BIOTIC CONTAMINATION

A formal biotic contamination field investigation was not conducted during the first phase of the RI. Potential operable unit impacts on the major sensitive terrestrial species identified in Section 3.7.2.1 and 3.7.2.3—the Swainson's hawk and the long-billed curlew—are addressed in Sections 5 (Contaminant Fate and Transport) and 6 (Baseline Risk Assessment). Potential contaminant impacts on aquatic species within the Columbia River, and on humans consuming potentially contaminated venison, are also discussed in Sections 5 and 6.

4.7 NATURE AND EXTENT OF CONTAMINATION SUMMARY

This subsection provides a summary of the known nature and extent of operable unit contamination within the three environmental media—air, soil, and ground water—subjected to field investigation during the first phase of the RI. Contaminants of potential concern are identified for each environmental medium. Contaminants of potential concern are those attributable to operable unit operations which were encountered at concentrations, elevated above local natural and anthropogenic background, that could potentially cause significant adverse human health or environmental impacts. In general, the contaminants of potential concern for each operable subunit are subsets of those anticipated, based on reviews of scoping information and early soil gas survey results (see Section 4.1.1).

Table 4-24 provides a matrix of contaminant of potential concern occurrence by environmental medium subjected to empirical evaluation (i.e., air, soil, and ground water).

Table 4-24. Summary of Contaminant-of-Potential-Concern Distribution at the 1100-EM-1 Operable Unit.

		Environmental Medium		
	Contaminant	Air	Soil	Ground Water
Inorganics	arsenic	--	X	--
	chromium	--	X	--
Organics	BEHP	--	X	--
	chlordane	--	X	--
	PCB	--	X	--
	tetrachloroethene	--	X[a]	X
	1,1,1-trichloroethane	--	X[a]	--
	trichloroethene	--	X[a]	--

[a]Contaminant of potential concern in soil gas.

4.7.1 Air Contamination Summary

The quantity and quality of the first round of ambient air monitoring data are too low, and the functional objectives of the second round of monitoring too restricted, to be of much use (see Section 4.2). However, some generalized, tentative hypotheses can be formed.

First, while data tentatively indicate that PAH could be a contaminant of potential concern for the 1100-3 operable subunit, soil data and ground-water data do not support the air results (i.e., no PAH was detected in subunit soils or ground water; therefore, there is no apparent source of this contaminant). This substantiates the fact that the ambient air monitoring data are of limited quality and indicates that the data set may be affected by sampling or analytical methodology artifacts.

Second, under moderate wind conditions, there seems to be no indication of substantial deterioration of ambient air quality in the vicinity of the 1100-EM-1 Operable Unit, and certainly no such deterioration that can be attributed to the operable unit. This hypothesis is tested by use of air dispersion modeling in Section 5 (Contaminant Fate and Transport Analysis).

Third, the highest concentrations of potential contaminant parameters were usually found in the upwind background samples. This may indicate a potential source of air pollution to the west of the operable unit. Such potential sources in this direction do exist; however, the testing of this hypothesis falls well outside of the scope of the 1100-EM-1 RI/FS.

4.7.2 Soil Contamination Summary

The eight potential contaminants of concern for the soil medium at the 1100-EM-1 Operable Unit (including soil gas contaminants) are arsenic, BEHP, chlordane, chromium, PCB, tetrachloroethene, 1,1,1-trichloroethane, and trichloroethene. These contaminants of potential concern can be partitioned among operable subunits in the following manner:

- 1100-1 (Battery Acid Pit)

  arsenic

- 1100-2 (Paint and Solvent Pit)

  chromium
  tetrachlorethene

- 1100-3 (Antifreeze and Degreaser Pit)

  arsenic
  chromium

- UN-1100-6 (Discolored Soil Site)

  BEHP
  chlordane

- Horn Rapids Landfill

  PCB
  chromium
  arsenic
  trichloroethene
  tetrachlorethene
  1,1,1-trichloroethane

- Miscellaneous Locations

  Pit 1-PCB
  Ephemeral Pool-PCB, chlordane.

No soil contaminants of potential concern are identified for the 1100-4 (Antifreeze Tank Site) operable subunit. The fate and transport of the above soil contaminants and the human health and environmental risks associated with them, are assessed in Sections 5 and 6, respectively.

4.7.3 Ground-Water Contamination Summary

Current data indicate that there is a single contaminant of potential concern for the 1100-EM-1 Operable Unit ground-water medium: tetrachloroethene (see Table 4-24). This substance is present near the 1100-2 Paint and Solvent Pit, but the extent and magnitude of the tetrachloroethene ground-water contamination have yet to be determined. The ground-water